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U.S. PATENT APPLICATION

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Invention: LIQUID CRYSTAL DISPLAY DEVICE AND METHOD FOR
MANUFACTURING THE SAME

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SPECIFICATION

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display devices are known as light-weight, reduced, and active research and development. A liquid crystal display is formed in a matrix, which are formed in between transparent electrodes. The advantage is provided between the electrodes and the liquid crystal. According to each pixel element.

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and providing a black matrix 70 formed of silicon thin film and silicide film on the opposing substrate, not only the direct incident light is blocked, but also the reflection of light within the liquid crystal display device is restrained, since the fine unevenness provided to the surface reduces the reflection rate and diffuses light (Japanese Patent Application Laid-Open Publication No. 10-319435).

According to the above method, shading layers are provided above and under the TFT so as to prevent incident light coming in from the exterior from reaching the semiconductor film or active layer of TFT, and most of the incident light fails to reach the semiconductor film. However, the incident angle of the light coming into the liquid crystal display device is not always perpendicular to the substrate, but has a certain degree of dispersion, and the light entering the display device may be repeatedly reflected within the device. When light reaches the TFT according to these reasons, the light causes problems such as increase of leak current of the TFT.

As shown in FIG. 10 (a), light (A) and light (B) are blocked by the upper shading layer 54 and the lower shading layer 51, and they will not reach the TFT 55. However, the oblique incident light (C) coming from the upper shading layer 54 side is reflected by the lower shading layer 51, and reaches the TFT 55. Moreover, the oblique incident light (D) coming from the upper shading layer 54 side is reflected by the lower shading layer 51, then reflected by the upper shading layer, before

Problems to be solved by the Invention

The present invention aims at solving the above-mentioned problems. The object of the present invention is to provide an active matrix liquid crystal display having improved brightness and high contrast, and the method of manufacturing the same.

Means for solving Problem

The present invention provides an active matrix liquid crystal display device comprising a liquid crystal cell, a switching element arranged in matrix, and shading layers mounted both on the upper side and the lower side of the switching element; wherein at least one of the upper and lower shading layers includes a sloped portion and has a convex shape protruding toward the switching element.

The present invention also provides an active matrix liquid crystal display device comprising a liquid crystal cell, a switching element arranged in matrix, and shading layers mounted both on the upper side and the lower side of the switching element; the upper shading layer including an upper sloped portion and having a convex shape protruding toward the switching element, the lower shading layer having a flat shape: wherein the upper shading layer is formed so that the upper sloped portion is located at a θ_1 angle to the horizontal direction, and the upper sloped portion has a horizontal direction length of l_{11} ; the lower shading layer is formed so

that the length from the end of the lower shading layer to the point that the line drawn downward to the vertical direction from the origin of the upper sloped portion crosses the lower shading layer is l_{12} ; and the maximum incident angle of the incident angle of the light traveling obliquely from the upper shading layer side is α_1 , the maximum incident angle of the light traveling obliquely from the lower shading layer side is β_1 , and the distance between the upper shading layer and the lower shading layer is d_1 , in which θ_1 , l_{11} and l_{12} each fulfill $\theta_1 > \beta_1$, $l_{11} > (l_{12} + d_1 \cdot \tan \alpha_1) / (1 - \tan \theta_1 \cdot \tan \alpha_1)$, and $l_{12} > d_1 \cdot \tan \beta_1$.

Moreover, the present invention provides an active matrix liquid crystal display device comprising a liquid crystal cell, a switching element arranged in matrix, and shading layers mounted both on the upper side and the lower side of the switching element; the lower shading layer including a lower sloped portion and having a convex shape protruding toward the switching element, the upper shading layer having a flat shape: wherein the lower shading layer is formed so that the lower sloped portion is located at a θ_2 angle to the horizontal direction, and the lower sloped portion has a horizontal direction length of l_{21} ; the upper shading layer is formed so that the length from the end of said upper shading layer to the point that the line drawn upward to the vertical direction from the origin of the lower sloped portion crosses the upper shading layer is l_{22} ; and the maximum incident angle of the light

traveling obliquely from the lower shading layer side is α_2 , the maximum incident angle of the light traveling obliquely from the upper shading layer side is β_2 , and the distance between the upper shading layer and the lower shading layer is d_2 , in which θ_2 , l_{21} and l_{22} each fulfill $\theta_2 > \beta_2$, $l_{21} > (l_{22} + d_2 \cdot \tan \alpha_2) / (1 - \tan \theta_2 \cdot \tan \alpha_2)$, and $l_{22} > d_2 \cdot \tan \beta_2$.

Further, the present invention provides an active matrix liquid crystal display device comprising a liquid crystal cell, a switching element arranged in matrix, and shading layers mounted both on the upper side and the lower side of the switching element; the upper and lower shading layers respectively including an upper sloped portion or a lower sloped portion, both having a convex shape protruding toward the switching element, and the lower sloped portion formed longer than the upper sloped portion: wherein the upper shading layer is formed so that the upper sloped portion is located at a θ_{31} angle to the horizontal direction, and the upper sloped portion has a horizontal direction length of l_{31} ; the lower shading layer is formed so that the lower sloped portion is located at a θ_{32} angle to the horizontal direction, and the lower sloped portion has a horizontal direction length of l_{32} ; and the maximum incident angle of the light traveling obliquely from the upper shading layer side is α_3 , the maximum incident angle of the light traveling obliquely from the lower shading layer side is β_3 , and the distance between the upper shading layer and the lower shading layer is d_3 , in which θ_{31} , θ_{32} , l_{31} and l_{32} each fulfill

$\theta_{31} > \beta_3, \theta_{32} > \alpha_3, l_{31} > \tan\beta_3 \cdot (d_3 + l_{32} \cdot \tan\theta_{32}),$ and $l_{32} > \tan\alpha_3 \cdot (d_3 + l_{31} \cdot \tan\theta_{31}).$

Moreover, the present invention provides an active matrix liquid crystal display device comprising a liquid crystal cell, a switching element arranged in matrix, and shading layers mounted both on the upper side and the lower side of the switching element; the upper and lower shading layers respectively including an upper sloped portion or a lower sloped portion, both having a convex shape protruding toward the switching element, and the upper sloped portion formed longer than the lower sloped portion: wherein the lower shading layer is formed so that the lower sloped portion is located at a θ_{41} angle to the horizontal direction, and the lower sloped portion has a horizontal direction length of l_{41} ; the upper shading layer is formed so that the upper sloped portion is located at a θ_{42} angle to the horizontal direction, and the upper sloped portion has a horizontal direction length of l_{42} ; and the maximum incident angle of the light traveling obliquely from the lower shading layer side is α_4 , the maximum incident angle of the light traveling obliquely from the upper shading layer side is β_4 , and the distance between the lower shading layer and the upper shading layer is d_4 , in which $\theta_{41}, \theta_{42}, l_{41}$ and l_{42} each fulfill $\theta_{41} > \beta_4, \theta_{42} > \alpha_4, l_{41} > \tan\beta_4 \cdot (d_4 + l_{42} \cdot \tan\theta_{42}),$ and $l_{42} > \tan\alpha_4 \cdot (d_4 + l_{41} \cdot \tan\theta_{41}).$

According to another aspect of the invention, in the above liquid crystal display devices, the upper shading layer and the

lower shading layer are each formed of one of the following: a metal film (Al, Ta, Ti, W, Mo, Cr, Ni), a singled layered film made for example of polysilicon, AlSi, MoSi₂, TaSi₂, TiSi₂, WSi₂, CoSi₂, NiSi₂, PtSi, Pd₂S, HfN, ZrN, TiN, TaN, NbN, TiC, TaC or TiB₂, or of a structure formed by laminating said films.

Even further, the present invention provides a liquid crystal display device according to the above, wherein either the upper shading layer or the lower shading layer, or both said upper and lower shading layers, is or are also used for wiring.

Moreover, the present invention provides a method for manufacturing the liquid crystal display device according to any disclosed above, wherein the layer underneath either the upper shading layer or the lower shading layer is formed using SiO₂, which is isotopically etched through HF using a resist mask, and removed of the mask before either the upper shading layer or the lower shading layer is formed thereon.

Lastly, the present invention provides a method for manufacturing the liquid crystal display device according to any disclosed above, wherein the layer underneath either the upper shading layer or the lower shading layer is formed using SiO₂, which is isotopically dry-etched using a resist mask, and removed of the mask before either the upper shading layer or the lower shading layer is formed thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an explanatory cross-sectional view around a

incident light to the switching element of the liquid crystal display device according to embodiment 3;

FIG. 10 is an explanatory view showing the incident light to the switching element in the prior art liquid crystal display device;

FIG. 11 is an explanatory cross-sectional view around the switching element according to the liquid crystal display device of prior art example 1;

FIG. 12 is an explanatory cross-sectional view around the switching element according to the liquid crystal display device of prior art example 2; and

FIG. 13 is an explanatory cross-sectional view around the switching element according to the liquid crystal display device of prior art example 3.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The preferred embodiment of the present invention will now be explained.

FIGS. 1 through 9 are used to explain the embodiments of the liquid crystal display device and the method for manufacturing the same according to the present invention. FIG. 1 is an explanatory cross-sectional view around a switching element in the liquid crystal display device of embodiment 1. FIG. 2 is an explanatory view showing the reflection of the incident light to the switching element of the liquid crystal display device according to embodiment 1. FIG. 3 is an

the distance between the upper shading layer and the lower shading layer is set as d_1 . According to the above, the two following formula must be fulfilled in order for the incident light coming in from the lower side to be reflected at the upper shading layer and to be reflected outward without reaching the TFT.

$$(\pi/2 - \theta_1 - \beta_{12}) + (2\beta_{12} + \beta) = \pi/2$$

Accordingly, for $\beta_{12} (= \theta_1 - \beta) > 0$ to be true for all $\beta (\beta \leq \beta_1)$, θ_1 must be

Moreover, as disclosed in FIG. 2,

is necessary. Further, since

therefore

Accordingly, for every $\beta (\beta \leq \beta_1)$ to be $l_{12} > l_{13}$, l_{12} must be

Moreover, for the oblique incident light coming from the upper side to not be reflected by the flat lower shading film,

Since, $\tan\theta_1 < 1$ and $\tan\alpha_1 < 1$ in an ordinary condition,

By forming the upper shading film 18 and the lower shading film 2 of the liquid crystal display device according to

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transparent electrode such as ITO is electrically connected to the drain electrode 13. Then, upper and lower shading layers are further formed in the channel width direction. Thereby, the incident light coming from the upper and lower sides are prevented from reaching the TFT.

Embodiment 2 will now be explained. The explanatory cross-sectional of the switching element 100 and the peripheral thereof in the liquid crystal display device according to embodiment 2 is shown in FIG. 6. Similar to embodiment 1 (FIG. 1), the switching element 100 comprises a transparent substrate 1, a lower shading layer 20, an insulation film 21, an active layer 22, a gate insulation film 23, a gate electrode 24, a source region 25, a drain region 26, a channel region 27, an interlayer insulation film 28, a contact hole 29 for taking out the electrodes, a source electrode 30, a drain electrode 31, a nitride film 32, an oxide film 33, an upper shading layer 34, and so on. Upper and lower shading layers 20 and 34 are positioned above and under the switching element 100 arranged in matrix. The difference from embodiment 1 is that according to embodiment 2, the shading layer 20 including a sloped portion 201 and having a convex shape protruding toward the switching element 100 is placed under the switching element.

As for the lower shading layer 20, the lower sloped portion 201 is located at a θ_2 angle to the horizontal direction, and the horizontal direction length of the lower sloped portion is l_{21} . As for the upper shading layer 34, the length from the end

of the upper shading layer 34 to the point that the line drawn upward in the vertical direction from the origin of the lower sloped portion 201 crosses the upper shading layer 34 is l_{22} . The maximum incident angle of the light traveling obliquely from the lower shading layer 20 side is α_2 , the incident angle of the light traveling obliquely from the upper shading layer 34 side is β , the maximum incident angle is β_2 , and the distance between the upper shading layer 34 and the lower shading layer 20 is set as d_2 . According to the above, θ_2 , l_{21} and l_{22} are each set as

$$\theta_2 > \beta_2 \dots \dots \text{formula (2-1)}$$

$$l_{21} > (l_{22} + d_2 \cdot \tan \alpha_2) / (1 - \tan \theta_2 \cdot \tan \alpha_2) \dots \dots \text{formula (2-2)}$$

$$l_{22} > d_2 \cdot \tan \beta_2 \dots \dots \text{formula (2-3)}$$

Similar to embodiment 1, by forming the upper shading film 34 and the lower shading film 20 of the liquid crystal display device according to embodiment 2 to fulfil all the conditions of formula (2-1), (2-2) and (2-3), it is possible to form a liquid crystal display device capable of preventing the oblique incident light coming both from the upper direction and the lower direction from reaching the TFT, while minimizing the size of the upper shading layer 34 and the lower shading layer 20.

One example of the method for manufacturing the liquid crystal display device according to embodiment 2 will be explained with reference to FIG. 7. As shown in FIG. 7 (a), wet etching is performed through HF and the like, using resist 19 as the mask. Since wet etching is an isotropic etching, it

forms the sloped portion 201 of the lower shading layer 20. The resist 19 is designed taking into consideration the process accuracy of the photolithography and the etching, and the alignment accuracy of the resist to the upper shading layer 34 and the TFT active layer 22. Moreover, dry etching using gas such as CF_4 or CF_4+CHF_3 , and the like could be performed instead of the wet etching.

Next, as shown in FIG. 7 (b), after removing the resist 19, the shading film constituting the lower shading layer 20 of the transistor is deposited through a CVD method or a sputtering method and the like. The shading film is then patterned through photo/etching so that the oblique incident light coming from the lower shading layer 20 side will not be reflected by an upper shading film 34 formed in the latter step, thereby creating the lower shading film 20. As mentioned in embodiment 1, various materials can be used to manufacture the shading film.

After that, an insulation film 21 made of SiO_2 film and the like is formed on the whole surface, similar to embodiment 1, and an active layer 22 of the transistor is formed on the insulation film 21. The method for forming the active layer is the same as that of embodiment 1. Then, the layer is patterned by photo/etching, in order to obtain the active layer 22 having the desired form. If necessary, an impurity ion implantation may be performed at this stage for controlling the threshold voltage. Next, a gate insulation film 23 is formed

on the active layer 22. The gate insulation film is either formed by CVD, by oxidation, or by the combination of both. Next, a gate electrode 24 is formed on the gate insulation film.

Next, impurity ion implantation is performed using the gate electrode as the mask, in order to form a source region 25 and a drain region 26. The region to which ion implantation is not performed becomes the channel region 27.

Then, insulation film is deposited on the whole surface, in order to form an interlayer insulation film 28. Next, contact holes 29 are formed over the source region 25 and the drain region 26 for taking out electrodes. Then, a source electrode 30 and a drain electrode 31 made of metal material such as Al is formed.

Thereafter, a nitride film 32 and an oxide film 33 is deposited on the whole surface in order to create a passivation film. Then, hydrogenation process is performed. Next, etch back or CMP and the like is performed to flatten the surface.

A shading film constituting the upper shading layer 34 of the transistor is deposited by a CVD method or a sputtering method and the like. Then, the formed film is patterned through photo/etching in order to form the upper shading layer 34. The shading film is formed using material having a light blocking effect, such as a metal film (Ta, Ti, W, Mo, Cr, Ni), a single layered film made of polysilicon, MoSi_2 , TaSi_2 , WSi_2 , CoSi_2 , NiSi_2 , PtSi , Pd_2S , HfN , ZrN , TiN , TaN , NbN , TiC , TaC or TiB_2 , or of a combination of these materials.

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Thereafter, an insulating film 28 not shown is formed, followed by a contact hole 29 formed on the insulating film. A transparent electrode such as ITO is electrically connected to the drain electrode 31. (The above method realizes a liquid crystal display device that is capable of preventing incident light coming from upper and lower directions from reaching the TFT.

Embodiment 3 will now be explained. The switching element of the liquid crystal display device according to the present embodiment characterizes in that both the upper shading layer and the lower shading layer have sloped portions. The embodiment is explained with reference to FIG. 8. FIG. 8 shows an example where the ends of the upper and lower shading films are aligned. As for the upper shading layer 49, the upper sloped portion 491 is located at a θ_{31} angle to the horizontal direction, and the horizontal direction length of the upper sloped portion is l_{31} . As for the lower shading layer 35, the lower sloped portion 351 is located at a θ_{32} angle to the horizontal direction, and the horizontal direction length of the lower sloped portion 351 is l_{32} . The maximum incident angle of the light traveling obliquely from the upper shading layer 49 side is α_3 , the maximum incident angle of the incident light traveling obliquely from the lower shading layer 35 side is β_3 , and the distance between the upper shading layer 49 and the lower shading layer 35 is set as d_3 . According to the above, the two following formula must be fulfilled in order for the incident light coming in from

the lower side to be reflected by the upper shading layer 49 and to be reflected outward without reaching the TFT.

$$(\pi/2 - \theta_{31}) + (2\beta_{32} + \beta) = \pi/2$$

$$\beta_{32} > 0$$

Accordingly, for $\beta_{32} (= \theta_{31} - \beta) > 0$ to be true for all $\beta (\beta \leq \beta_3)$, θ_{31} must be

$$\theta_{31} > \beta_3 \dots \text{formula (3-1)}$$

Moreover, it is necessary for l_{33} to be $l_{33} < l_{31}$. Therefore,

$$l_{33} = (d_3 + l_{32} \cdot \tan \theta_{32} + (l_{31} - l_{33}) \cdot \tan \theta_{31}) \cdot \tan \beta$$

and

$$l_{31} > \tan \beta_3 \cdot (d_3 + l_{32} \cdot \tan \theta_{32}) \dots \text{formula (3-2)}$$

Similarly, in order for the oblique incident light coming from the upper area to be reflected by the lower shading layer 35 and to not reach the TFT but to reflect outward, the angle θ_{32} of the lower sloped portion 351 of the lower shading layer 35 must be

$$\theta_{32} > \alpha_3 \dots \text{formula (3-3)}$$

Moreover, it is necessary for l_{34} to be $l_{34} < l_{32}$. Therefore,

$$l_{32} > \tan \alpha_3 \cdot (d_3 + l_{31} \cdot \tan \theta_{31}) \dots \text{formula (3-4)}$$

By forming the upper shading layer 49 and the lower shading layer 35 of the liquid crystal display device to fulfil all the conditions of formula (3-1), (3-2), (3-3) and (3-4), it is possible to prevent the oblique incident light coming both from the upper direction and the lower direction from reaching the TFT, while minimizing the size of the upper shading layer 49 and the lower shading layer 35.

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$\begin{pmatrix} \text{C}_{60}\text{H}_2 \\ \text{C}_{60}\text{H}_4 \\ \text{C}_{60}\text{H}_6 \end{pmatrix}$ $\begin{pmatrix} \text{C}_{70}\text{H}_8 \\ \text{C}_{70}\text{H}_{10} \\ \text{C}_{70}\text{H}_{12} \end{pmatrix}$ $\begin{pmatrix} \text{C}_{76}\text{H}_{12} \\ \text{C}_{76}\text{H}_{14} \\ \text{C}_{76}\text{H}_{16} \end{pmatrix}$ $\begin{pmatrix} \text{C}_{84}\text{H}_{16} \\ \text{C}_{84}\text{H}_{18} \\ \text{C}_{84}\text{H}_{20} \end{pmatrix}$ $\begin{pmatrix} \text{C}_{90}\text{H}_{18} \\ \text{C}_{90}\text{H}_{20} \\ \text{C}_{90}\text{H}_{22} \end{pmatrix}$ $\begin{pmatrix} \text{C}_{96}\text{H}_{20} \\ \text{C}_{96}\text{H}_{22} \\ \text{C}_{96}\text{H}_{24} \end{pmatrix}$ $\begin{pmatrix} \text{C}_{100}\text{H}_{22} \\ \text{C}_{100}\text{H}_{24} \\ \text{C}_{100}\text{H}_{26} \end{pmatrix}$ $\begin{pmatrix} \text{C}_{108}\text{H}_{24} \\ \text{C}_{108}\text{H}_{26} \\ \text{C}_{108}\text{H}_{28} \end{pmatrix}$ $\begin{pmatrix} \text{C}_{114}\text{H}_{26} \\ \text{C}_{114}\text{H}_{28} \\ \text{C}_{114}\text{H}_{30} \end{pmatrix}$ $\begin{pmatrix} \text{C}_{120}\text{H}_{28} \\ \text{C}_{120}\text{H}_{30} \\ \text{C}_{120}\text{H}_{32} \end{pmatrix}$

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$\left\{ \begin{matrix} \text{C}_{60}\text{H}_8 \\ \text{C}_{60}\text{H}_6 \\ \text{C}_{60}\text{H}_4 \\ \text{C}_{60}\text{H}_2 \end{matrix} \right\}$ $\left\{ \begin{matrix} \text{C}_{70}\text{H}_{12} \\ \text{C}_{70}\text{H}_{10} \\ \text{C}_{70}\text{H}_8 \\ \text{C}_{70}\text{H}_6 \\ \text{C}_{70}\text{H}_4 \\ \text{C}_{70}\text{H}_2 \end{matrix} \right\}$ $\left\{ \begin{matrix} \text{C}_{84}\text{H}_{16} \\ \text{C}_{84}\text{H}_{14} \\ \text{C}_{84}\text{H}_{12} \\ \text{C}_{84}\text{H}_{10} \\ \text{C}_{84}\text{H}_8 \\ \text{C}_{84}\text{H}_6 \\ \text{C}_{84}\text{H}_4 \\ \text{C}_{84}\text{H}_2 \end{matrix} \right\}$ $\left\{ \begin{matrix} \text{C}_{90}\text{H}_{18} \\ \text{C}_{90}\text{H}_{16} \\ \text{C}_{90}\text{H}_{14} \\ \text{C}_{90}\text{H}_{12} \\ \text{C}_{90}\text{H}_{10} \\ \text{C}_{90}\text{H}_8 \\ \text{C}_{90}\text{H}_6 \\ \text{C}_{90}\text{H}_4 \\ \text{C}_{90}\text{H}_2 \end{matrix} \right\}$

switching element is improved according to the invention, which contributes to realizing a brighter and higher contrast display.

Moreover, by specifying the size and the angle of the sloped portions of the upper and lower shading layers, the incident light from the upper or lower shading layer side is prevented from reaching the TFT. According to the invention, leak current of the TFT is reduced, and a good liquid crystal characteristic is obtained. Even further, since the size (area) of the shading layers is minimized, the aperture rate is increased.

The active matrix liquid crystal display device according to the present embodiments comprises upper and lower shading layers formed of a metal film (Al, Ta, Ti, W, Mo, Cr, Ni), a single layered film made of polysilicon, AlSi, MoSi₂, TaSi₂, TiSi₂, WSi₂, CoSi₂, NiSi₂, PtSi, Pd₂S, HfN, ZrN, TiN, TaN, NbN, TiC, TaC or TiB₂, or a laminated structure formed of these materials. Accordingly, the shading layers provide high light blocking effect, which leads to improving the TFT characteristics.

The active matrix liquid crystal display device according to the embodiment utilizes at least either the upper or the lower shading layer as a wiring layer. This feature contributes to simplifying the manufacture steps and to reducing the manufacturing cost.

According to an embodiment of the active matrix liquid crystal display device, the layer underneath the upper shading

layer or the lower shading layer is formed by SiO_2 , which is etched isotropically through HF using a resist mask, the upper or lower shading layer being formed on this layer after removing the resist. This enables the sloped portion of the shading layer to be formed relatively easily with good control and good repeatability. Moreover, by proper selection of the agent for the etching, the resist mask material, and the material of the layer underneath the shading layer being etched, a shading layer including a sloped portion having the desired angle can be formed.

According to another embodiment of the active matrix liquid crystal display device, the layer underneath the upper shading layer or the lower shading layer is formed by SiO_2 , which is dry-etched isotropically using a resist mask, the upper or lower shading layer being formed on this layer after removing the resist. This enables the sloped portion of the shading layer to be formed relatively easily with good control and good repeatability. Moreover, by proper selection of the gas material and the gas pressure for etching, a shading layer including a sloped portion having a desired angle can be formed.

In general, the dispersion of the incident light (the light provided from the light source to the liquid crystal display device) is ± 15 degrees at maximum, and the dispersion of the reflected light (the light that once passed through the liquid crystal display device being reflected at the back surface of the glass substrate or the surface of the lens system and

returning to the display device) is ± 20 degrees at maximum. Therefore, the angle of the sloped portion of the upper shading layer is approximately 20 degrees at maximum, and the angle of the sloped portion of the lower shading layer is approximately 15 degrees at maximum.

Effect of the Invention

The present invention enables to provide an active matrix liquid crystal display having improved brightness and higher contrast, and the method for manufacturing the same.